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Soft magnetic excitations and quantum critically in  $Sr_3Ru_2O_7$ STEPHEN HAYDEN, C. LESTER, University of Bristol, R. RAMOS, University of Kent, R. PERRY, University College London, T. CROFT, University of Bristol, R. BEWLEY, T. GUIDI, Rutherford Appleton Laboratory, E. FORGAN, University of Birmingham — The application of a magnetic field of approximately  $B_c = 8 T$ induces quantum critical behavior in  $Sr_3Ru_2O_7$ . Near  $B_c$ , the resistivity shows an anomalous power law temperature dependence and the linear specific heat becomes large. In addition, new ordered phases with strong nematic tendencies appear below 1 K near  $B_c$ . These phases have recently been identified as spin density wave order. Here we report an inelastic neutron scattering study of the low-energy magnetic excitations. We find a dramatic field-induced softening of the collective magnetic excitations in the region surrounding  $B_c$ . This suggests that the quantum critically observed in  $Sr_3Ru_2O_7$  is magnetic in origin. The presence of additional magnetic excitations can also explain the increase in entropy and specific heat present near  $B_c$ .

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